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Ms. Laurie Peterson-Wright
EG&G Rocky Flats, Inc.
P.O. Box 464, Bldg. 080
Golden, Colorado 80402-0464

Subject: Submittal of March 29, 1995 Meeting Minutes
Technical Working Group Meeting for Operable Unit No. 7
(MTS Contract 353017TB3)

Dear Ms. Peterson-Wright:

Enclosed are meeting minutes to document the March 29, 1995, technical working group meeting for the OU 7 landfill closure interim measure/interim remedial action and environmental assessment.

If you have any questions, please contact me at your convenience.

Sincerely,

Myra K. Vaag
Project Manager

Enclosure

cc:	W. Bartholomew w/o	EG&G	B. Caruso	Stoller
	R. Cygnarowicz	EG&G	A. Crockett	Stoller
	T. Lindsay	EG&G	M. Eisenbeis	Stoller
	P. Martin	EG&G	K. Fiebeg	Stoller
	P. Corser	TerraMatrix	S. Franklin	Stoller
	J. Kendall	TerraMatrix	C. Gee	Stoller
			J. Jankousky	Stoller
			D. Palmer	Stoller
			L. Ross w/o	Stoller
			B. Stephanus w/o	Stoller
			OU7 Project File	
			MKV Chron	

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ADMIN RECORD

The S.M. Stoller Corporation 5700 Flatiron Parkway Boulder, Colorado 80301-5718 303-449-7220 FAX 303-443-1408

Minutes for the OU 7 Seep Collection/Landfill Closure IM/IRA
Technical Working Group Meeting
March 29, 1995

Meeting attendees were introduced. The following topics were discussed:

Water Balance Results

Stoller presented the results of a water balance for the landfill mass using MODFLOW model outputs for the no-action alternative. The model was calibrated using all available site-specific data. Inflows that contribute to leachate generation include net recharge by infiltration of precipitation after evapotranspiration, horizontal groundwater flow from the alluvium (primarily on the north side of the landfill) under the existing groundwater intercept system, and vertical groundwater flow from the weathered bedrock beneath the landfill. Outflow is limited to horizontal flow at the east boundary of the landfill.

Approximately 60 percent of the inflow is groundwater from the alluvium, and 40 percent is recharge by infiltration of precipitation (error in water balance calculations is approximately 5 percent). The water balance shows that both a cap and a slurry wall on the north side of the landfill are necessary to prevent additional leachate generation.

HELP Modeling Results for Landfill Cover

The evaluation of landfill cover options up to this point has been based on EPA guidance for hazardous waste landfills under RCRA Subtitle C. A composite-barrier cover is recommended. The preferred capping option for OU 7, Option 2, is a composite-barrier but uses a low permeability soil instead of the recommended clay layer to reduce costs. Option 2 meets the Subtitle C requirement that the cover must have a permeability that is less than or equal to the permeability of the underlying soil. Permeability of the weathered bedrock underlying the landfill ranges from 1E-06 to 1E-07 cm/sec.

TerraMatrix is running the HELP model to determine if a single-barrier cover could be used to reduce the cost while providing equivalent protection. Preliminary results indicate that an FMC or clay layer meet the permeability requirements for landfill covers. Stoller suggested that the single-barrier cover approach (and assumptions and input parameters for the HELP modeling) be presented to CDPHE and EPA because the approach does not follow RCRA guidance.

Preliminary Groundwater Focused Risk Assessment Results

Stoller presented preliminary results for the focused human health risk assessment for residential ingestion of groundwater. Risks were calculated for potential contaminants of concern (PCOCs) identified in upper hydrostratigraphic unit (UHSU) groundwater from two locations--beneath the East Landfill Pond and downgradient of the dam. Site-to-background comparisons were performed using the Gilbert methodology. Two screening steps were performed: an ARARs screen and a PPRG screen. The 95 percent upper confidence limit (UCL) for each PCOC that passed the screens was used to calculate the risks of groundwater ingestion. Professional judgment was not exercised to remove PCOCs in any of these steps.

The carcinogenic risk from residential ingestion of UHSU groundwater beneath the pond is within the EPA acceptable risk range of 1E-04 to 1E-06 (3E-05); however, the noncarcinogenic risk is above the EPA acceptable risk or hazard index (HI) of 1 (HI=5). The primary contributor to noncarcinogenic risk is selenium, which is naturally occurring in bedrock. The risks from residential ingestion of UHSU groundwater downgradient of the dam are within the EPA acceptable risk range (carcinogenic risk = 2E-07, HI=0.06).

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Professional judgment will be used to evaluate the remaining PCOCs to identify laboratory contaminants and variability in naturally occurring analytes.

Proposed Recommendation for Landfill Closure

Based on the results of the water balance, HELP modeling, risk assessment for groundwater, and budget constraints, Stoller recommended the following actions for a phased closure at OU 7:

- Delist the seep/pond water to change the regulatory status and ease water management issues
- Construct a slurry wall on the north side of the landfill where the groundwater intercept system has failed to decrease groundwater inflow, leachate generation, and outflow at the seep
- Place fill required to achieve grade for the final cover before the cap is constructed to decrease recharge by infiltration of precipitation, leachate generation, and outflow at the seep
- Construct a single-barrier cover for landfill closure
- Continue monitoring the seep to evaluate the effectiveness of these actions as they are implemented and determine if leachate treatment is necessary as part of the final action for landfill closure. Leave two wells (6187 and 72093) previously proposed for abandonment to monitor water levels across the new slurry wall before the cover system is constructed.

Status of the PAM

Letter from CDPHE to DOE - DOE distributed a draft letter from CDPHE, dated March 27, regarding the OU 7 Seep Collection and Treatment Proposed Action Memorandum (PAM). CDPHE reviewed DOE's proposal to cancel the PAM and cannot not approve the proposal because (1) a leachate collection system implemented separately from the landfill closure IM/IRA is required as a result of the dispute resolution for the pond water IM/IRA, (2) timely implementation of the leachate collection system is necessary because the schedule for landfill closure is threatened by budget shortfalls and reprioritization, and (3) based on contaminant loading of the leachate, treatment is justified.

CDPHE is willing to consider modifications to the PAM to reduce costs and/or make it more compatible with the landfill closure IM/IRA even if they require adjustments to the schedule. CDPHE also noted that treatment of leachate must meet state water quality standards (stream segment 4 standards).

DOE Response - The response may include a proposal to modify the PAM for source area groundwater control instead of leachate collection and treatment to reduce the volume of leachate generated and may include a general proposal for final closure. The PAM schedule may be impacted by the US Fish and Wildlife Service (USFWS); a Preble's Meadow Jumping Mouse survey will be conducted in May, June, and July 1995. DOE may propose delisting the seep/pond water in the IM/IRA decision document.

Action Items

01-186	Completed.
187	Determine if a small French drain would decrease head buildup in groundwater west of the landfill using the existing groundwater model (J. Jankousky, Stoller). In progress.
188-204	Completed.
205	Perform a risk assessment on groundwater downgradient of the dam (K. Crute, Stoller). A preliminary risk assessment was performed. Based on comments from the EG&G risk assessment staff, background comparisons were performed using the Gilbert

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methodology and a 95% UCL was used for the focused risk assessment. Groundwater downgradient of the dam falls within the acceptable risk range. Groundwater beneath the pond falls just above the acceptable risk range.

206 Conduct an ecological benchmark screen (M. Vaag, Stoller). In progress.

207 Completed.

208 Assist EG&G in preparing the OU 7 closure strategy paper for the next agency meeting (M. Vaag, Stoller). In progress.

209-210 Completed.

211 Research EPA guidance on applying for ARARs waivers (S. Franklin, Stoller). In progress.

212 Check Record of Decision for the Lowry Landfill to see what type of cover section was used (M. Eisenbeis, Stoller).

213 Determine if Jefferson County has any regulations or specific requirements for landfill closure (P. Corser, TerraMatrix).

214 Determine which single-barrier cover sections meet the 1E-06 cm/sec permeability requirements. Estimate effectiveness, implementability, and costs for each (P. Corser, TerraMatrix).

215 Provide input parameters and results for the HELP modeling, including precipitation data used, conservativeness of the input data, and leakage results for fill material before cap is constructed (P. Corser, TerraMatrix).

216 Obtain a copy of EPA's comments on the modeling for the OU 4 cap (P. Witherill, DOE).

217 Research data usability for other OUs to see if OU 7, which used 1990 to 1995 data, is consistent (L. Peterson-Wright, EG&G).

218 Determine if soil excavated from the new landfill can be used for fill at OU 7 (T. Lindsay, EG&G).

219 Conduct groundwater modeling runs to determine the effect of building a short slurry wall on the north side of the landfill. Look at the longevity of the existing groundwater intercept system (J. Jankousky, Stoller).

220 Determine status of the compatibility testing for the slurry wall (P. Corser, TerraMatrix).

221 How does the recent failure of the clay cap at the Martin Marietta plant in Jefferson County affect the OU 7 design (P. Corser, TerraMatrix)?

222 Prepare a schedule for the modified PAM (P. Martin, EG&G).

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Next Meeting

The next meeting will be at 10:00 a.m. on April 5, 1995, at Stoller in Boulder. The topic of discussion is closure strategies.

List of Attendees

Name	Organization	Phone
Brian Caruso	Stoller	546-4338
Kelley Crute	Stoller	546-4440
Mary Eisenbeis	Stoller	546-4474
John Jankousky	Stoller	546-4412
Tom Lindsay	EG&G	966-6985
Peter Martin	EG&G	966-8695
Laurie Peterson-Wright	EG&G Project Manager	966-8553
Paul Pigeon	RTG/DOE Support	966-5611
Tim Reeves	SAIC/DOE Support	966-7530
Myra Vaag	Stoller Project Manager	546-4417
Peg Witherill	DOE Project Manager	966-6585

TABLE 7-6
Industrial Area IM/IRA/DD
Active Treatment Facilities at Rocky Flats Plant

Treatment	Description	Contaminants Treated	Capacity (gal/month)	Actual (gal/month)	References
OU1	UV/Hydrogen Peroxide and ion exchange	Uranium, hardness, metals, organic chemicals, PCBs, TDS	864,000	100,000 ave. 300,000 max.	(EG&G 1993ff), (DOE 1993)
OU2	Coagulation, precipitation, flocculation, neutralization, cross membrane filtration, granular activated carbon (GAC)	Solids, metals, organic chemicals, uranium, plutonium, americium	2,592,000 (D) 1,296,000 (A)	604,800 ave. 1,296,000 max.	(EG&G 1991j), (DOE 1993), (EG&G 1993jj)
Bldg. 374 - Waste Treatment Facility	Flash evaporation (4-effect steam heated process with spray evaporation)	Salts, inorganics, metals, uranium, americium, plutonium	1,256,584 (A)	760,805 ave. 1,268,793 max.	(ASI 1988), (EG&G 1993kk)
Bldg. 910	Vapor compression, multi-effect, multi-stage process with spray evaporation	Salts, inorganics, uranium, plutonium, americium, metals	3 units at 540,000 1,620,000 (D)		(EG&G 1993jj)
Solar Ponds*	Solar evaporation and storage for 374	Solids, metals, chemicals, uranium, plutonium, americium	93,458 (solar evaporation)	93,458 ave.	(ASI 1991d)
Bldg. 774 - Old Waste Treatment Facility	Precipitation with iron sulfate, ship to 374 for further treatment	Solids, chemical compounds, metals, high levels of uranium, plutonium, americium	Services only water from 771, 774, and bottled water		(EG&G 1993jj), (EG&G 1993ll)
Sanitary Treatment Plant (STP)	Settling, clarification, anaerobic digestion (activated sludge)	Biological, nitrates, phosphorous, chlorides, chromium, solids, organic matter, metals, <500 ppb organics	21,000,000 (D) 15,000,000 (A)	4,500,000 ave. 9,500,000 max.	(ASI 1991e), (EG&G 1993mm)

(A) = Actual capacity
(D) = Design capacity

PCBs = Polychlorinated Biphenyls
UV = Ultraviolet

TDS = Total Dissolved Solids

* It should be noted that the Solar Ponds do not accept new inputs and are scheduled for closure.

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TABLE 7-7
Industrial Area IM/IRA/DD
Current Disposition of Water and Waste
at Active Treatment Facilities Rocky Flats Plant

Treatment Facility	Water Disposition	Waste Disposition
OU1 - UV/Peroxide	Feeds into effluent tanks to be sampled, then released to the South Interceptor Ditch system or retreated if sample levels are unacceptable.	Ion exchange resins are purged periodically and stored until they can be sent to the Nevada Test Site.
OU2 - GAC unit	Discharges directly into South Walnut Creek.	Spent GAC and filter bags are stored onsite until they can be sent to the Nevada Test Site.
374 - Process Waste	Collected into effluent tanks to be sampled, then recycled to the 374 cooling tower and steam plant.	Wet sludge is saltcreted and stored onsite.
774 - Old Process Waste	Water is transferred to 374 for further treatment.	Wet sludge is saltcreted and stored onsite.
910 - Portable Evaporators	Collected into effluent tanks to be sampled, then injected into the raw water system for use by the plant site cooling towers.	Wet sludge is saltcreted and stored onsite.
Solar Ponds	Water is evaporated directly into the air.	Sludge and sediment are pondcreted and stored onsite.
STP	Collected into effluent tanks to be sampled, then released to the B series ponds.	Dried sludge is packaged and shipped to the Nevada Test Site.

Notes:
GAC = granular activated carbon
STP = sewage treatment plant
UV = ultraviolet

References: *RFP Mission Transition Program Management Plan*, Appendix A-3 (EG&G 1992a) and Operational Safety Analysis reports (EG&G 1992o; EG&G 1993ii)

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AGENDA
OU 7 IM/IRA/EA DD Project Team

Wednesday, March 29, 1995
S. M. Stoller Conference Room
11:00 AM

1. **Water Balance Results (S. M. Stoller)**

2. **HELP Modelling Results (S. M. Stoller)**

3. **Preliminary Groundwater Focused Risk Assessment Results (S. M. Stoller)**

4. **Proposed Recommendations for Landfill Closure (Roundtable)**

5. **Status of the PAM (Roundtable)**

Next meetings:	April 5, 1995, 10:00, Stoller in Boulder TOPICS: Closure Strategies Agency Interface Meeting - Tentatively, April 12, 1995 (Only Peg and Laurie attending)

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The S.M. Stoller Corporation
Informal Memorandum

To:	**Brian Caruso** **Myra Vaag**
From:	**John Jankousky**
Date:	**3/28/95**
Subject:	**Water Balance for OU 7 Landfill Mass**

A water balance for the landfill mass was performed using the MODFLOW model outputs for the no-action alternative.. This water balance was performed on layer 1 in the model, which includes alluvial material and artificial fill and excludes weathered bedrock and unweathered bedrock. The water balance includes flow in and out of the weathered bedrock from the alluvium or artificial fill. The following steps were performed:

1. A boundary plane was defined using the right hand and front faces of individual cells in layer 1. These cells were just inside the drain cells used to simulate the existing groundwater intercept system. See Figures 1 and 2.

2. Cell-by-cell flows recorded at the final modeled time step were used in tabulating the flows through the defined boundary plane. Cell-by-cell flows out of the right face and out of the front face are recorded as positive numbers. A multiplier of -1 was used where flows into the landfill are from right to left or from bottom to top (plan view). Cells on the north, west, and south are tabulated together because these are the expected inflow cells to the landfill. Cells on the east side are tabulated separately because they are the expected outflow cells to the landfill. See Table 1.

3. Vertical flow is tabulated for all cells within the boundary planes. See Table 2.

4. The landfill area receiving recharge from precipitation (infiltration) is calculated. A check was performed to locate any dry cells, which will not receive recharge. The flow rate of recharge is calculated using the recharge area and the recharge flux rate. See Table 3.

5. A water balance is performed using the horizontal inflow, vertical inflow, recharge, and horizontal outflow. See Table 4.

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Summary of Water Balance Results

Recharge as a percentage of (Inflow + Recharge)	40.6%
Horizontal Inflow as a percentage of (Inflow + Recharge)	58.5%
Vertical Inflow as a percentage of (Inflow + Recharge)	0.9%
Summary of Flows (percent)	100%

Definitions of terms:

Recharge or infiltration as used in the model is the net recharge from precipitation after evapotranspiration.

Horizontal inflow is groundwater flow between cells within a single model layer (flow through the right face or front face as defined in Figure 1).

Vertical inflow is groundwater flow between cells in different model layers (flow through the lower face as defined in Figure 1).

FIGURE 1: MODFLOW TERMINOLOGY FOR A SINGLE MODEL CELL

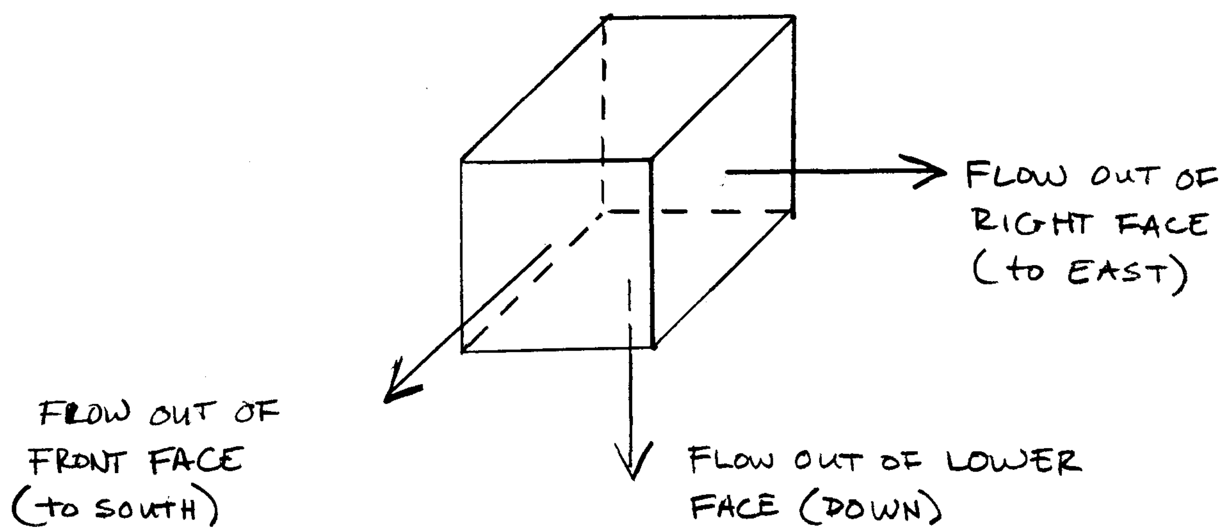

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Figure 2: Cells Defining Landfill Mass

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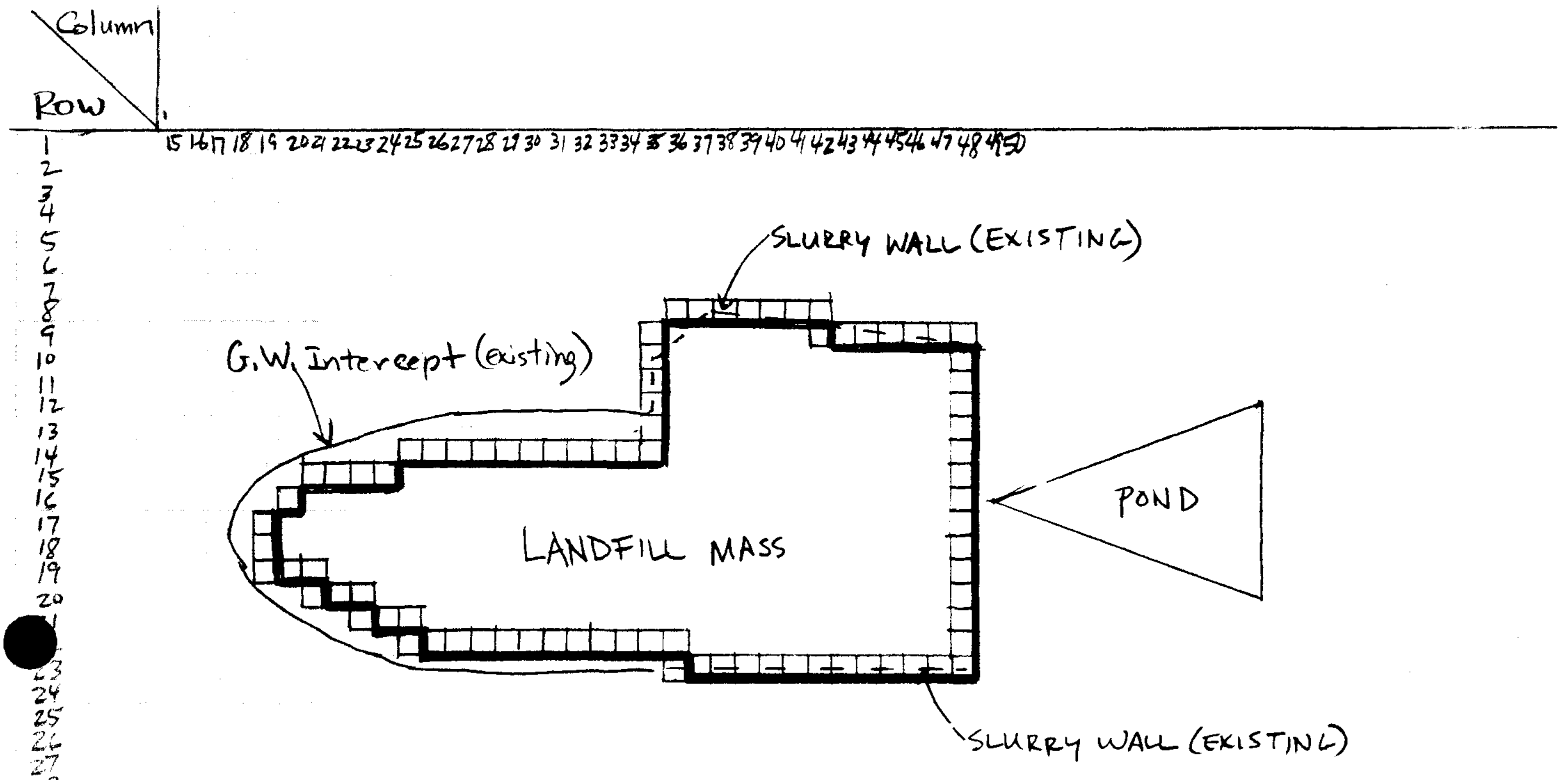

Plan View

□ Outlined cells are used in defining boundary of landfill mass.

▬ Heavy line indicates a right face or front face used to define boundary for the landfill mass.

– – – SLURRY WALL (EXISTING)

——— G.W. INTERCEPT (EXISTING)

Table 1: Flows Into/Out of Landfill Boundary Cells

Cells on North, West, and South, from Northeast Corner going Counterclockwise

Layer	Row	Column	Right Face Flow	Multiplier	Adjusted Right Face Flow	Front Face Flow	Multiplier	Adjusted Front Face Flow
1	9	48				1.80392	1	1.80392
1	9	47				2.50377	1	2.50377
1	9	46				2.99005	1	2.99005
1	9	45				3.43565	1	3.43565
1	9	44				3.96345	1	3.96345
1	9	43				4.09245	1	4.09245
1	9	42	-0.364	-1	0.364			
1	8	42				2.63024	1	2.63024
1	8	41				5.24548	1	5.24548
1	8	40				5.49044	1	5.49044
1	8	39				5.86757	1	5.86757
1	8	38				6.29782	1	6.29782
1	8	37				7.30339	1	7.30339
1	8	36				3.34105	1	3.34105
1	9	35	3.73568	1	3.73568			
1	10	35	7.22277	1	7.22277			
1	11	35	5.81374	1	5.81374			
1	12	35	5.40489	1	5.40489			
1	13	35	21.4175	1	21.4175			
1	14	35	23.1798	1	23.1798	2.85119	1	2.85119
1	14	34				4.75741	1	4.75741
1	14	33				5.20433	1	5.20433
1	14	32				4.87684	1	4.87684
1	14	31				4.40711	1	4.40711
1	14	30				3.87388	1	3.87388
1	14	29				4.1292	1	4.1292
1	14	28				3.92673	1	3.92673
1	14	27				4.29003	1	4.29003
1	14	26				4.32123	1	4.32123
1	14	25				5.13031	1	5.13031
1	15	24	5.5	1	5.5	4.16952	1	4.16952
1	15	23				1.59877	1	1.59877
1	15	22				2.74582	1	2.74582
1	15	21				3.84887	1	3.84887
1	16	20	3.21	1	3.21	2.98358	1	2.98358
1	17	19	3.74	1	3.74			
1	18	19	2.35	1	2.35			
1	19	19	0.77	1	0.77			
1	19	20				3.60446	-1	-3.60446
1	19	21				1.63479	-1	-1.63479
1	20	21	5.21	1	5.21			
1	20	22				2.93216	-1	-2.93216
1	20	23				1.40261	-1	-1.40261
1	21	23	8.79	1	8.79			
1	21	24			0	2.39657	-1	-2.39657
1	21	25				1.11711	-1	-1.11711
1	22	25	7.02	1	7.02			
1	22	26				1.88846	-1	-1.88846
1	22	27				2.01388	-1	-2.01388
1	22	28				1.90708	-1	-1.90708
1	22	29				1.69755	-1	-1.69755

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Cells on North, West, and South, from Northeast Corner going Counterclockwise								
Layer	Row	Column	Right Face Flow	Multiplier	Adjusted Right Face Flow	Front Face Flow	Multiplier	Adjusted Front Face Flow
1	22	30				0.722055	-1	-0.72206
1	22	31				1.13532	-1	-1.13532
1	22	32				0.708587	-1	-0.70859
1	22	33				0.379044	-1	-0.37904
1	22	34				0.0853	-1	-0.0853
1	22	35				-0.58236	-1	0.58236
1	22	36				-1.69074	-1	1.69074
1	23	36	-0.02	1	-0.02			
1	23	37				-1.4108	-1	1.4108
1	23	38				-1.51998	-1	1.51998
1	23	39				-1.65569	-1	1.65569
1	23	40				-1.58931	-1	1.58931
1	23	41				-0.88289	-1	0.88289
1	23	42				-0.7993	-1	0.7993
1	23	43				-0.70853	-1	0.70853
1	23	44				-1.07423	-1	1.07423
1	23	45				-0.86485	-1	0.86485
1	23	46				-1.25802	-1	1.25802
1	23	47				-1.37266	-1	1.37266
1	23	48				-1.19811	-1	1.19811
Summary (positive is into landfill)					103.7084			111.0624
Cells on East Landfill Boundary								
Layer	Row	Column	Right Face Flow	Multiplier	Adjusted Right Face Flow	Front Face Flow	Multiplier	Adjusted Front Face Flow
1	10	48	-0.50577	1	-0.50577			
1	11	48	-0.12559	1	-0.12559			
1	12	48	0.0355	1	0.0355			
1	13	48	0.684296	1	0.684296			
1	14	48	1.12288	1	1.12288			
1	15	48	75.5069	1	75.5069			
1	16	48	144.987	1	144.987			
1	17	48	100.605	1	100.605			
1	18	48	18.2716	1	18.2716			
1	19	48	6.1708	1	6.1708			
1	20	48	0.627617	1	0.627617			
1	21	48	0.126864	1	0.126864			
	22	48	0.221681	1	0.221681			
1	23	48	0.598206	1	0.598206			
Summary (positive is flow out of landfill)					348.327			
	shaded cells define the boundary plane for the landfill mass.							

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Table 2: Vertical Flow, All Landfill Cells			
All Landfill Cells, Lower Face, Flow Down into Layer 2			
Layer	Rows	Column	Lower Face Flow
1	17-19	20	-0.15396
	16-19	21	-0.0763
	16-20	22	-0.002962
	16-20	23	0.05286
	16-21	24	0.07871
	15-21	25	0.15677
	15-22	26	0.100485
	15-22	27	0.057977
	15-22	28	0.008398
	15-22	29	-0.02503
	15-22	30	-0.001137
	15-22	31	-0.009951
	15-22	32	0.021033
	15-22	33	0.02415
	15-22	34	-0.007705
	15-22	35	-0.022259
	9-22	36	-0.568836
	9-23	37	-0.23908
	9-23	38	-0.19395
	9-23	39	-0.28492
	9-23	40	-0.35295
	9-23	41	-0.24118
	9-23	42	-0.204132
	10-23	43	-0.229403
	10-23	44	-0.371012
	10-23	45	-0.298848
	10-23	46	-0.43418
	10-23	47	-0.39192
	10-23	48	0.386756
Summary (positive is flow out of landfill)			-3.222576

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Table 3: Calculation of Recharge Area and Recharge Amount						
Layer	Row	Columns		No. of Cells	No. of Dry Cells	No. of Cells with Recharge
		From	To			
1	9	36	42	7	0	7
1	10	36	48	13	0	13
1	11	36	48	13	0	13
1	12	36	48	13	0	13
1	13	36	48	13	0	13
1	14	36	48	13	0	13
1	15	25	48	24	0	24
1	16	21	48	28	0	28
1	17	20	48	29	0	29
1	18	20	48	29	0	29
1	19	20	48	29	0	29
1	20	22	48	27	0	27
1	21	24	48	25	0	25
1	22	26	48	23	0	23
1	23	37	48	12	0	12
Total No. of Cells Receiving Recharge						298
Area per Cell						2500
Total Area (ft^2)						745000
Recharge Flux (ft/day)						2.00E-04
Recharge (ft^3/day)						149

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Table 4: Water Balance for Landfill Mass		
Horizontal Flow In		
Flow into Landfill through East-West Cell Faces	103.7	ft^3/day
Flow into Landfill through North-South Cell Faces	111.1	ft^3/day
Vertical Flow In		
Flow into Landfill through Bottom Cell Faces	3.2	ft^3/day
Recharge into Landfill	149	ft^3/day
Flow In + Recharge	367.0	ft^3/day
Recharge as Percent of (Flow In + Recharge)	40.6	%
Horizontal Flow In as Percent of (Flow In + Recharge)	58.5	%
Vertical Flow In as Percent of (Flow In + Recharge)	0.9	%
Summary of Flows In (percent)	100.0	%
Water Balance: Compare Inflow and Outflow		
Flow In + Recharge	367.0	ft^3/day
Horizontal Flow Out of Landfill at East Boundary	348.3	ft^3/day
Percent Error	5.1	%

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